# CLAIMS

WHAT IS CLAIMED IS:

1. A process for producing a high to super high active surfactant product comprising the steps of:

feeding a neutralizing agent and an organic acid to a reaction zone of a vacuum reactor, wherein the organic acid is a sulfuric or sulfonic acid or a combination thereof to form a reaction mixture;

applying a vacuum pressure of greater than about 0 psia and less than about 15 psia to the reaction zone;

heating the reaction zone via a heating jacket having a heat transfer medium, wherein the heat transfer medium is not cooling water;

agitating the reaction mixture in the reaction zone;

reacting the neutralizing agent and the organic acid in the reaction zone to produce a salt;

reducing the water content of the reaction mixture by evaporation in the reaction zone; and

discharging a surfactant product from the vacuum reactor.

2. The process of claim 1, wherein the neutralizing agent comprises an alkali or alkaline earth metal hydroxide, an alkali metal carbonate or bicarbonate, an ammonium hydroxide, an amine, an alkanolamine, or a combination thereof; and wherein the organic acid comprises a $C_{10}$-$C_{20}$ alkyl sulfuric acid, a $C_{10}$-$C_{20}$ alkyl ether sulfuric acid, a $C_9$-$C_{16}$ linear alkyl benzene sulfonic acid, a $C_{12}$-$C_{18}$ methyl ester sulfonic acid or sulfonic acid fatty acid, a $C_{12}$-$C_{18}$ alpha olefin sulfonic acid or disulfonic acid, or a combination thereof.

3. The process of claim 1, wherein the neutralizing agent comprises sodium hydroxide; and wherein the organic acid comprises a $C_{12}$-$C_{18}$ alkyl sulfuric acid, a $C_{12}$-$C_{18}$ alkyl ether sulfuric acid, a $C_{12}$-$C_{18}$ alpha olefin sulfonic acid, or combinations thereof.

4. The process of claim 1, wherein the vacuum reactor is a thin film or wiped film reactor, and wherein the reaction mixture is capable of forming a film in the reaction zone.

5. The process of claim 1, further comprising the step of feeding co-surfactants or other non-surfactant additives to the reaction zone.

6. The process of claim 5, wherein the co-surfactants added to the reaction zone comprise a cationic surfactant, an anionic surfactant, a nonionic surfactant, an ampholytic surfactant, a zwitterionic surfactant, or a combination thereof.

7. The process of claim 5, wherein the other non-surfactant additives added to the reaction zone comprise rheology modifiers, cosmetic agents, abrasives, or combinations thereof.

8. The process of claim 1, wherein the neutralizing agent is fed to the reaction zone before the organic acid is fed to the reaction zone.

9. The process of claim 1, wherein the vacuum pressure is from about 0.17 psia to about 9.67 psia.

10. The process of claim 1, wherein the heat transfer medium is a vapor or a liquid heat transfer media having a sufficient temperature and a sufficient pressure.

11. The process of claim 10, wherein the sufficient temperature of the vapor heat transfer media is from about 212° F or greater and the sufficient pressure is from about 0 psig or greater.

12. The process of claim 10, wherein the sufficient temperature of the liquid heat transfer media is from about 150° F or greater and the sufficient pressure is from about 14.5 psia or greater.

13. The process of claim 1, wherein the heat transfer medium is steam.

14. The process of claim 13, wherein the pressure of the steam is about 0 psig or greater and the temperature of the steam is about 212° F or greater.

15. The process of claim 13, wherein the pressure of the steam is from about 3.7 psia to about 15 psia and the temperature of the steam is from about 150° F to about 212° F.

16. The process of claim 1, wherein the heat transfer medium is an oil or an electric heating element having a sufficient temperature.

17. The process of claim 16, wherein the sufficient temperature of the oil or the electric heating element is about 150° F or greater.

18. The process of claim 1, wherein the heat transfer medium is water or a glycol having a sufficient temperature and a sufficient pressure.

19. The process of claim 18, wherein the sufficient temperature of the water or the glycol is about 150° F or greater and the sufficient pressure is about 14.5 psia or greater.

20. The process of claim 1, wherein the surfactant product has a solids concentration of about 50% by weight or greater.

21. The process of claim 1, wherein the surfactant product has a solids concentration of from about 70% to about 98% by weight.

22. The process of claim 1, wherein the surfactant product has a solids concentration of from about 83% to about 95% by weight.

23. The process of claim 1, further comprising the step of transferring the surfactant product to a mixer to incorporate at least one additive.

24. The process of claim 23, wherein the additive added to the mixer comprises a colorant, a co-surfactant, an enzyme, a builder, a chelating agent, a clay-soil removal or anti-redeposition agent, a bleaching agent, a soil release polymer, a polymeric dispersing agent, a dye transfer inhibiting agent, a brightener, a foam suppressor, a fabric softener, a fragrance, a rheology modifier, a cosmetic agent, an abrasive, or a combination thereof.

25. The process of claim 1, wherein the surfactant product is discharged from the vacuum reactor in a form comprising a paste, a liquid, a slurry, a semi-solid, or a gel.

26. A surfactant product produced by a process comprising the steps of:

feeding a neutralizing agent and an organic acid to a reaction zone of a vacuum reactor, wherein the organic acid is a sulfuric or sulfonic acid or a combination thereof to form a reaction mixture;

applying a vacuum pressure of greater than about 0 psia and less than about 15 psia to the reaction zone;

heating the reaction zone via a heating jacket having a heat transfer medium, wherein the heat transfer medium is not cooling water;

agitating the reaction mixture in the reaction zone;

reacting the neutralizing agent and the organic acid in the reaction zone to produce a salt;

reducing the water content of the reaction mixture by evaporation in the reaction zone; and

discharging a surfactant product from the vacuum reactor.

27. The surfactant product of claim 26, wherein the surfactant product has a solids concentration of about 50% by weight or greater.

28. The surfactant product of claim 26, wherein the surfactant product has a solids concentration of from about 70% to about 98% by weight.

29. The surfactant product of claim 26, wherein the surfactant product has a solids concentration of from about 83% to about 95% by weight.

30. The surfactant product of claim 26, wherein the heat transfer medium is steam and the heat transfer medium is maintained at a pressure of about 0 psig or greater and a temperature of about 212° F or greater.

31. The surfactant product of claim 26, wherein the heat transfer medium is steam and the heat transfer medium is maintained at a pressure of from about 3.7 psia to about 15 psia and a temperature of from about 150° F to about 212° F.

32. The surfactant product of claim 26, wherein the surfactant product is discharged from the vacuum reactor in a form comprising a paste, a slurry, a semi-solid, a liquid, or a gel.

33. A vacuum neutralizing reactor for producing a surfactant product, comprising:

a reaction zone;

a wall having an exterior surface and an interior surface, wherein the interior surface surrounds the reaction zone;

at least one inlet opening in the wall for the introduction of a neutralizing agent and an organic sulfuric or sulfonic acid or a combination thereof to the reaction zone;

an agitator device disposed within the reaction zone or fixedly attached to the wall to agitate and react the organic sulfuric or sulfonic acid or the combination thereof and the neutralizing agent;

a vacuum device in communication with the reaction zone to provide the reaction zone with a vacuum pressure of greater than about 0 psia and less than about 15 psia; and

a heating device having a heat transfer medium that is not cooling water, and wherein the heating device is fixedly attached to the exterior surface of the wall to provide heat energy to the reaction zone.

34. The vacuum neutralizing reactor of claim 33, wherein the heating device comprises an external heating jacket; and wherein the heat transfer medium is steam maintained at a pressure of about 0 psig or greater and a temperature of about 212° F or greater.

35. The vacuum neutralizing reactor of claim 33, wherein the heating device comprises an external heating jacket; and wherein the heat transfer medium is steam maintained at a pressure of from about 3.7 psia to about 15 psia and a temperature of from about 150° F to about 212° F.

36. The vacuum neutralizing reactor of claim 33, wherein the heating device comprises an external heating jacket; and wherein the heat transfer medium is an oil or an electric heating element maintained at a temperature of about 150° F or greater.

37. The vacuum neutralizing reactor of claim 33, wherein the heating device comprises an external heating jacket; and wherein the heat transfer medium is water or a glycol maintained at a temperature of about 150° F or greater and a pressure of about 14.5 psia or greater.